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ABSTRACT

In 1985, Apple Computer, Inc., and the Houston Independent School District began a project to create a model School of the Future at the F. M. Black Middle School. As described in this guide, the project was designed to demonstrate how microcomputers and related technology can make the process of instruction more efficient and effective. The purpose of this document is to share what was learned from the School of the Future project with teachers and administrators from other school districts considering implementing similar projects. The information in the guide was compiled from more than 2 years of notes and experiences. The chapters represent some of the model steps for implementing technology-based instruction into a model school site. Individual chapters address the following: (1) planning the project; (2) selecting personnel; (3) training the staff; (4) orienting the staff; (5) providing equity; (6) involving the community; (7) preparing the building for technology; (8) automating the school office; (9) computing the school's schedule; (10) creating instructional materials; and (11) managing instruction. A concluding statement notes that research on the attitudes of the teachers, students, and parents indicated that the program had a positive effect on the school. (SD)

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SCHOOL OF THE FUTURE HANDBOOK

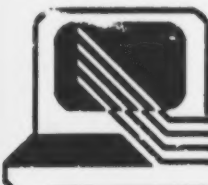
A GUIDE FOR TECHNOLOGY IMPLEMENTATION

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SCHOOL OF THE FUTURE HANDBOOK

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School of the Future

Handbook

INTRODUCTION

In 1985, Apple Computer Inc. and the Houston Independent School District began a project to create a model school of tomorrow at F. M. Black Middle School. The project demonstrates how microcomputers and related technology can make the process of instruction more efficient and effective. The purpose of this handbook is to share what we have learned from the School of the Future project with teachers and administrators from other school districts.

Models play an essential role in effecting change, because people and organizations alike resist change until they can see the potential benefits manifested in a tangible form. We have found that teachers, as well as members of other professions, respect traditions and are often resistant to change.

A strong model, on the other hand, lets educators see for themselves how innovative techniques can be adapted and applied to their own schools. Houston's School of the Future serves as a model for educators across the nation.

This handbook will serve as a guide to those school administrators who wish to replicate all or part of the program originally implemented at F. M. Black. The information was compiled from more than two years worth of notes and experiences. The chapters represent what we feel are some of the ideal steps for implementing technology-based instruction into a model school site.

Research and previous experience—failures as well as successes—were used to identify the following crucial elements in ensuring the feasibility of duplicating this model.

- *Use of existing facilities*

School districts everywhere cope with strict financial constraints. Consequently, they will not be able to duplicate any model that calls for costly modifications of existing school structures. The School of the Future was planned to require no extensive changes at the F. M. Black campus.

- *Acceptance of change*

Research about change and the process by which we come to accept change makes it clear that when people are *forced* to comply with an innovation, it is doomed to failure. Successful, well-documented strategies for effecting organizational change, that involve the people concerned, were selected for implementation at the School of the Future, from staff training to the preparation of curricula.

- *Management of individualized instruction*

The microcomputer provides educators with an invaluable tool for tailoring instruction to individual needs. The premise for the School of the Future is to use large-group and small-group teaching to complement the laboratory-based individual instruction that computers supply so efficiently.

- *Incentives*

Another factor designed to foster acceptance of the innovations introduced in the School of the Future is a variety of incentives for students, teachers, administrators, and parents. These include mention in Apple publications, meetings with distinguished visitors, and the availability of numerous resources.

- *Qualitative evaluation*

Most prior research into the effectiveness of educational computing has failed to tie gains in student achievement directly to increased use of computers, because in a real school setting, many factors come into play that are difficult to isolate as experimental variables.

Evaluation of this project is qualitative, concentrating on anecdotal documentation of successes and failures. The resulting information, much of which is summarized in this document, serves as a guide in replicating the School of the Future model across the country.

What are the computer resources at the School of the Future, and how are they used?

Apple Computer, Inc. contributed 210 computer systems to augment the 34 computers already in place at F. M. Black Middle School. The addition brought the pupil-to-computer ratio to about 4:1. Apple also contributed 80 printers and 140 copies of *AppleWorks*.

The computers have five instructional uses:

- Drill-and-practice tutorials to meet the needs of students with learning difficulties
- Discovery activities that use simulations and other programs to foster student interest in education
- Problem-solving and logical thinking programs to develop student ability to use their analytical skills
- Word processing and database programs to facilitate research and writing in all academic areas
- Fulfillment of the state mandate for computer literacy training

The computers are also used administratively, to keep records of grades, attendance, inventory, etc. These applications enable teachers and guidance counselors to spend more time with students instead of doing paperwork.

What are the project goals?

- *Enhance curriculum integration*

Microcomputers are used to solidify the interrelationship between courses.

- *Increase accountability*

As part of the process of individualizing instruction, computer programs track performance with respect to the school district's curriculum objectives.

- *Foster parental involvement and school-home communication*

The Houston Independent School District places great emphasis on parental involvement in the process of education. Through visits to computer classrooms, computer checkout programs, and family computer training, the School of the Future reinforces that emphasis while heightening community awareness of computer technology.

- *Enhance productivity*

Microcomputers save time and effort. Word processing, data management, and tool-based applications greatly facilitate communication and reduce the burden of paperwork for students and teachers.

- *Provide flexible scheduling*

Variable pupil/teacher ratios and multidisciplinary teaching contribute to the development of improved delivery systems for instruction. In their new role as "managers of instruction," teachers devise innovative strategies that can be shared in large-scale training programs.

What was achieved at F. M. Black Middle School? What results can you expect?

- The entire staff is aware of the technology at Black and its impact on the school's curriculum.
- Many teachers have taken the initiative to learn about computers and use them on a voluntary basis. Over 70% now use computers in the labs, classroom, and for personal productivity.
- Over 80% of the student body is involved in computerized math instruction. Strong leadership and comprehensive courseware contribute to this.
- Over 65% of the student body is involved in word processing activities and computer assisted language-arts instruction.
- Computers are available and are being used in every major subject area and most of the electives.
- Computer labs are used regularly by 30% of the staff.
- Teachers are aware of the serious shortcomings in educational software and have identified quality programs which have the greatest potential for improving instruction.
- Teachers report that students have shown significant improvement after participating in computer-based tutorials in language arts and math.
- The special education department at F. M. Black has become very active in seeking out appropriate software and use the computers on a regular basis.

- Teachers use the computers in a variety of instructional settings to improve the quality of education at F. M. Black.
- Teachers have been extremely cooperative and receptive to the implementation of the computers at F. M. Black considering the extra time and effort they must commit without any monetary compensation.

The following is from the Houston Independent School District's "Quarterly Evaluation Report."

Based upon evaluation of the School of the Future program, it was the observation of the researcher that the program did influence the instructional climate of the entire school, through the enhancement of staff morale, student morale, and instructional organization. Even though the appropriate student achievement data was not available to show that the program had a positive impact on student performance, it was the perception of most of the instructional staff (74 percent) that student learning received a reasonable degree or a great deal of improvement during the 1986-87 school year. With the availability of the 1987 *MAT6 (Metropolitan Achievement Test Version 6)* scores as a baseline, and the subsequent administration of the *MAT6* in 1988, the appropriate data will be obtained for a more conclusive assessment of program impact on student achievement.

CHAPTER 1

PLANNING THE PROJECT

Implementation of system-wide technological innovations in schools has traditionally been associated with problems of acceptance on the part of teachers and administrators. The introduction of computers into F. M. Black Middle School's curriculum and administration was no different in terms of the risk of rejection involved.

Factors such as time, credibility, the curriculum and institutional structure were all items cited by researchers (Bentzen, 1974; Goodlad, 1970; Lortie, 1975), that had to be taken into consideration for a successful implementation. However, the foremost risk was perceived to be the resistance of teachers to change. It was a threat to project success to which scant attention had been paid in the past, when implementing similar projects.

One of the reasons teachers have been slow to learn about computers is fear: fear of the unknown, fear of obsolescence or replacement, fear of social problems, and a fear that is a combination of math anxiety, and the assumption that computer work is primarily mathematics. (Lortie, 1975)

In order to reduce the risk of rejection, the project was implemented by starting with a core group of teachers and administrators convinced of the utility of computers to improve student achievement. These people served as role models and project facilitators. They enabled the project to progress to encompass nearly every subject area and grade level as well as a significant portion of the tasks of the school administrators.

In fact, the point has been reached where the computers are no longer looked upon as an addition to the teaching at F. M. Black but are now viewed as a normal part of the learning process. Teachers are presently sharing information with their colleagues about teaching with computers, and in effect becoming educational technology advocates.

This chapter outlines the basic steps appropriate in implementing a school-wide technology-based instructional program as experienced at F. M. Black Middle School.

N. Bentzen, *Changing Schools: The Magic Feather Principle* (New York: McGraw Hill Book Company, 1974)

J. Goodlad, *Behind the Classroom Door* (Worthington: Wadsworth Publishing Company, Inc., 1970)

D. Lortie, *School: A Sociological Study* (Chicago: University of Chicago Press, 1975)

Preliminary Activities

Establish a technology task force.

Select lead teachers from major content areas to become a planning committee for technology-based education. The group should include faculty members who are interested in computers as well as a few who are skeptical.

Establish goals for the school.

These should be correlated to district-wide goals and priorities. Technology will enhance areas of the curriculum while keeping in perspective the fact that computer literacy is not a goal in itself, but a means to an end.

Conduct orientation activities for teachers.

In a voluntary program, the participation of the teachers will determine the success or failure of the project. Providing teachers with productive orientation activities will help the project begin smoothly.

Correlate software.

Software resources should be matched to district objectives. This is a time-consuming process, but it is essential if the teachers are expected to embrace technology in a short period.

Identify resource needs.

Major subject areas that have a variety of available software will consume most of the budget. Through surveying teachers and analyzing curriculum, areas of concern will become apparent.

Integrating Computer-Managed Instruction

Develop goals.

The school staff should be familiar with the advantages of computer-managed instruction. Attainable goals will help focus their energy in the right direction.

Set planning priorities.

The first priority should be to educate the students. Any computer-related management techniques should be evaluated to see if they contribute to attaining that goal.

Develop instructional strategies and applications.

Each teacher should be responsible for his or her own plan for using computers. Consultants should be available to assist in the development of implementation plans that incorporate a computerized management system.

Develop management templates.

In a non-network environment, pencil-and-paper management is crucial. The staff should be assisted in developing templates for recordkeeping that are consistent within departments and even throughout the entire school. Those templates will provide evidence of the computers' impact on the instructional process.

Staff Development

Identify required staff competencies.

The administration should outline skills required by the staff to effectively use software that tracks progress. Develop a survey that asks, in a nonthreatening way, questions about each teacher's computer expertise.

Determine present staff competencies.

A survey should be distributed, collected, and analyzed well in advance of the project's beginning. Formal and informal interviews can be used to determine the validity of the responses.

Establish a staff development program.

The program should be based on the needs—and only the needs—that address the instructional priorities of the school. The scheduling of the program should take into consideration the teachers' other duties and previous commitments.

Train the staff.

Sessions should be held at times which are convenient for teachers, especially in situations where teachers are not being compensated for attending training. Informal training should take up the majority of the trainer's time, since that is the best way of individualizing instruction to fit the needs of the staff.

Evaluate staff training.

Survey teachers periodically to determine the effectiveness of the training they receive.

Hardware and Software Distribution

Establish classroom selection criteria and process.

Criteria should be based on the level of teacher interest, the amount of software available for the content area, and the physical characteristics of the room. The final decision about the location of hardware should rest with the principal.

Establish computer laboratories.

Computer labs should be in convenient locations. Rooms should be large enough to accommodate chairs, tables, cabinets, and other necessary equipment.

Establish a software library.

Knowledgeable staff members should be recruited to distribute the instructional software. The checkout system should be adaptable to both long-term and short-term loans.

Organization and Implementation

Develop a logistical support system.

A system that enables teachers to seek technical support from their peers should be in place. A higher level of support should be available if the first method is insufficient.

Develop a materials and equipment support system.

When materials and equipment are defective, they should be returned to a central location for repair. Keeping all equipment functional should be a top priority.

Develop a computer laboratory sign-in procedure and schedule.

A good scheduling system will enable teachers to plan in advance for computer use. Without such a system, computer-guided education will not be as organized, which may reduce its effectiveness.

CHAPTER 2

SELECTING PERSONNEL

Selecting the proper staff for a school wide project where computers are to be used for instruction is a crucial step. The best hardware and software are useless without the right staff. This chapter suggests criteria, based on the experience at F. M. Black Middle School, for selecting faculty and administrators who will work together enthusiastically to provide a proper environment for computer-based instruction.

Qualifications of a District-Level Director

The director will be responsible for the systematic implementation of computers providing for training and ensuring that the hardware and software selected are compatible and maintainable. In addition to an administrator's certificate, the following qualifications are desirable:

Education and Experience:

- excellent communication skills
- advanced training in instructional technology and educational computing, and/or on-the-job experience which would contribute to a broad knowledge of technical and curriculum issues
- experience in instructional and administrative computing applications with broad knowledge of educational software
- management experience in supervising staff and relating to top level administrators
- classroom teaching experience and broad instructional background, K-12
- training experience with adult learners
- change agent training
- good network of information resources including vendor products, technical publications, university contacts and liaisons with community leaders

A district-wide director will be responsible for many of the activities listed below.

Planning Duties:

- promote staff and student literacy
- preparing and monitoring a budget for computer use
- designing and implementing a district-wide computing plan that provides overall direction for the district, yet accomodates the needs of individual schools
- serving as a technology advocate who can articulate the trends, goals, and objectives to various levels of the staff as well as the school board, parent groups, and business/community leaders

- developing long- and short-term technology goals of the district and soliciting the involvement of various constituencies in the process
- identifying hardware and software solutions that will improve districtwide productivity and/or enhance instruction
- coordinate policies regarding technology
- preparing and implementing guidelines for computer use
- creating hardware/software selection criteria

Operational Duties:

- directing the distribution, scheduling, and maintenance of computer hardware and software
- organizing and staffing a computer resource center
- evaluating and cataloging software
- serving as chairperson for a district technology committee
- serving as resource person for calls and correspondence related to instructional technology
- monitoring and reporting on effectiveness of computer use in relation to district goals
- conducting periodic needs analysis
- creating and/or enforcing district copyright policies

Training Duties:

- conducting training sessions to develop teacher competencies related to the use of technology for instruction
- conducting training sessions to develop teacher competencies in the use of productivity tools
- conducting training sessions to develop administrator and support staff competencies related to the use of administrative technology
- organizing and staffing training sessions for parents and the community at large
- assisting staff in selecting and modifying courseware and support materials

Other Duties:

- reviewing and preparing grant proposals
- publishing a district newsletter
- reviewing literature and periodicals that deal with technology
- meeting with community, business, and parent organizations
- serving as liaison between vendors and district
- attending computing conferences and workshops
- visiting successful technology-based programs in other districts

Qualifications of a Building-Level Coordinator

The building-level coordinator often divides time between teaching classes and providing assistance to teachers. Because of the additional responsibilities, he or she should teach no more than two classes per day. The F. M. Black building-level coordinator, as a graduate of the Houston Independent School District's Teacher Technologist Training Program, received 296 hours of computer training. Coordinators elsewhere will probably not have that amount of training available in their own districts, but many colleges offer courses in educational computing. In addition to a teaching certificate, the following qualifications are desirable.

Education and Experience:

- some college-level training in instructional technology or educational computing
- knowledge of at least one programming language, (BASIC, Logo, PILOT, Pascal, or C)
- knowledge of the microcomputer disk operating system used at the school level
- knowledge of basic productivity tools, such as word processing, spreadsheets, databases, and graphics production programs
- classroom teaching experience

As with the district-level coordinator, the building-level coordinator may also serve in many roles, depending on the number of computers in the school, the sophistication of the staff, the amount of teaching responsibility, and whether there is a district-level coordinator. Allowing for those constraints, the building-level coordinator may be responsible for the following activities.

Operational Duties:

- adaptation of the district computing plan to the needs of the teachers and students at the building level
- serving as the contact for reporting hardware and software problems
- assisting teachers with instructional strategies and productivity tools
- assisting building administrators and support staff with administrative software and productivity tools
- coordinating distribution and management of computer courseware for the building
- evaluating and recommending hardware and software as requested
- serving on district computer committee
- enforcing district copyright policies

Teaching/Training Duties:

- conducting building-level training sessions to develop teacher competencies related to the use of technology for instruction
- conducting building-level training sessions to develop teacher competencies related to the use of technology for management and administrative duties
- conducting building-level training sessions to develop administrator and support staff competencies related to administrative technology use
- assisting staff in selecting or modifying courseware and materials

Other Duties:

- assisting in writing grant proposals
- publishing a school newsletter
- serving as a computer club sponsor
- meeting with the school's parent organization
- attending vendor demonstrations
- attending computing conferences and workshops

Qualifications of Teachers Using Technology

Teachers in a school where stand-alone microcomputers are to be used intensively should have all of the qualities of the best teachers plus additional technical expertise, creativity, and stamina. The teacher must have in-depth knowledge and understanding of his or her content area plus necessary technical skills. In addition to a teaching certificate, the successful teacher using technology will have a majority of the qualifications listed below.

Education and Experience:

- some formal training in instructional technology or educational computing
- basic understanding of the hardware used at the school
- operating knowledge of a wide variety of courseware relevant to the subject area
- basic knowledge and use of productivity tools, such as word processors, spreadsheets, databases, and graphics

Operational Duties:

- enforcing the copyright policies of the school
- showing responsible operation of the equipment
- following procedures for requesting and purchasing technology-based materials for the classroom and computer lab
- recording effectiveness of computer use in instruction
- using a personal computer for administrative tasks

Teaching Duties:

- using computers to facilitate instruction
- using software designed specifically for the age group and interest levels being taught
- selecting and organizing appropriate materials so lessons flow efficiently
- evaluating materials and reporting their effectiveness to ensure informed decisions regarding the purchase and use of instructional software
- coordinating activities and special student projects with other teachers

Other Duties:

- meeting with parents to promote the school's technology endeavors
- keeping abreast of trends and changes in the field of educational computing
- attending computing conferences, workshops, and training

Conclusion

Computer-based education is still a new field, requiring pioneering spirits on the part of the teachers, administrators, and support staff. Staff members who have the qualifications noted above will be the best to have supporting a school where computers are plentiful and in constant use.

CHAPTER 3 TRAINING THE STAFF

General Approach at F. M. Black Middle School

The implementation of any new method of instruction within a structured system requires extensive training in order to bring about effective change. This section describes the plan for staff training implemented in the 1986-87 school year. The plan was developed in response to the emphasis in the School of the Future proposal to conduct extensive and meaningful teacher training.

The training approach developed for F. M. Black's School of the Future project facilitated effective, orderly integration of computers into the school's curriculum and administrative functions. In addition to exposing teachers to basic computer operations and computer applications for various content areas, an important part of the training focused on new teaching methods and classroom management techniques appropriate for a computerized classroom environment.

The following steps document how the training was done at F. M. Black Middle School. These step-by-step guidelines will facilitate training and project implementation in other schools.

Staff Training—A Step-by-Step Approach

Step 1—*Determine training needs and schedule.*

Survey all staff members to determine which staff members need training and in what areas training is needed. The survey should also include a question concerning the times that staff would prefer to attend sessions. This information should then be entered into a database for ease of determining the most popular training times. The final schedule should be written to maximize the use of available time.

The training survey should include a place for participants to write their questions and concerns about the project. It should also prompt them to list the ways they can support the project. The answers to these questions should then be written and distributed in a timely manner to each staff member by the project coordinator. Having their questions answered quickly will encourage staff members to participate and will build their confidence in the project coordinator.

Step 2—Set up a training classroom.

Choose a room for computer training that can accommodate a large training session (24 people). At the School of the Future the following equipment was typically used:

- 24 Apple IIe computers with two disk drives and color monitors, 80-column cards, and printers
- 9 Apple Macintosh computers
- 8-12 printers

Each teacher in the session should have a computer for hands-on experience with each software package. This will insure better retention of the computer skills being taught.

In addition to hardware, the software for training must be selected. Recommended materials include:

Apple Presents Apple (Apple IIe; Producer: Apple Computer, Inc.)—A menu-driven tutorial covering the features and capabilities of the Apple IIe computer.

Apple Presents AppleWorks (Apple IIe; Producer: Apple Computer, Inc.)—This diskette guides the user through a simulation of the basic *AppleWorks* features by posing problems and helping the user solve them. It monitors the user's progress and offers optional quizzes on what has been learned.

DOS 3.3 System Master (Apple IIe; Producer: Apple Computer, Inc.)—This program is used to demonstrate programs the user might encounter that are not menu driven and that require a knowledge of DOS commands to operate.

FredWriter (Apple IIe; Producer: California Department of Education)—This is a simple-to-use, memory-resident word processor that has many features designed to make the computer into a powerful text editor.

A Guided Tour of the Macintosh (Macintosh; Producer: Apple Computer, Inc.)—Software that introduces the user to the Macintosh desktop in conjunction with the *Guided Tour* cassette tape.

MacPaint (Macintosh; Producer: Apple Computer, Inc.)—A graphics program that enables teachers to create visually appealing handouts and teaching materials.

MacWrite (Macintosh; Producer: Apple Computer, Inc.)—A versatile word processing program that helps teachers create instructional materials.

Computers in Teaching (Apple IIe; Producer: MECC)—This software is an overview of instructional computing using samples from MECC courseware to demonstrate teaching strategies.

New Horizons Educators' Computer Literacy Series (Apple IIe; Producer: Darryl L. Sink & Associates, Inc.)—A multi-media package designed to help educators integrate software into their curriculum.

Step 3—Design training sessions.

Involve teachers in selecting the topics for which they would like to have training. Use this information to determine what proficiencies and activities are necessary for each of the training sessions. Use handouts for each of the training sessions.

See if the training can be noted in individual teacher files or if it can be documented as professional development for participants. The length of the sessions may be affected by the time requirements set by the state central education agency regarding credited professional growth opportunities. This should be determined before you set the length of the sessions. In organizing the training sessions, plan each presentation with these general time breakdowns in mind:

25% time for lecture
50% time for practice
25% time for discussion

Conduct sessions at any of the following times:

- on inservice days
- in one-hour sessions before school
- in one-, two-, or three-hour* sessions after school
- on Saturday if the school building can be opened
- during the teachers' planning periods where individual help can be provided and teachers can take advantage of individualized instruction contained in modules that are designed to teach the basics of certain computer programs

This training can be conducted by the project coordinator or a staff member who is highly skilled in the area which is being addressed in the training session.

- * The length of the session will depend on other scheduled school activities, teacher interest level, the custodial schedule, and the cooperation of the school administrators.

The courses recommended to be on the training schedule in the first year of the project include:

Teacher Training Courses

Introduction to Computers—Objective: to teach hardware components, assembly and disassembly, and special keyboard functions of the microcomputer. Instructional applications are covered and some BASIC commands are introduced. (Offer September through November)

Suggested software: Apple Presents Apple, ProDOS, DOS 3.3 System Master, FrEdWriter

Keyboarding—Objective: to allow the participants the opportunity to look at on-line and off-line activities designed to teach the participants how to type and how to improve keyboarding skills. (Offer September through December)

Suggested software: Keyboard Cadet, Master Type, Typing Tutor, Success with Typing

Word Processing—Objective: to give novice users a practical background in word processing and its applications in the classroom, using a word processing package. (Offer September through December)

Suggested software: AppleWorks Word Processor, FrEdWriter

Using Databases in the Classroom—Objective: to introduce a database system and survey the types of reports that can be generated from the database. (Offer November through February)

Suggested software: PFS: File and Report, AppleWorks Database, Quick File

Tools and Teacher Utilities—Objective: to furnish an overview of commercial packages that can be used to create instructional materials. (Offer October through March)

Suggested software: Print Shop, Dazzle Draw, MECC Teacher Utilities, Newsroom

Classroom Organization—Objective: to integrate an individualized approach into the computerized classroom by establishing learning centers and specialized classroom management techniques. (Offer January through April)

Introduction to Instructional Software (in each content area)—Objective: to identify and discuss classroom applications of content area software that meet specific instructional needs and

correlate with district objectives. (Offer January through June)
Suggested software: MECC Using Computers in the Classroom

Integrating Computers into the Curriculum—Objective: to integrate a curriculum into the classroom that utilizes computer-assisted instruction. (Offer March through June)

Software Evaluation—Objective: to provide teachers with an opportunity to review new software packages in order to locate strengths and weaknesses based on recommended methods. (Offer March through July)

Support Staff Courses

Using Databases for Administration—Objective: to provide an overview of a database package for administrative use. (Offer September through January)

Administrative Applications of Word Processing—Objective: to provide an overview of a word processing package for administrative use. (Offer September through January)

Parent Training Courses

Basic Hands-On for Parents—Objective: to teach hardware components, assembly and disassembly, and special keyboard functions of the microcomputer to parents. Instructional applications are covered, and some BASIC commands are introduced. (Offer November through March)

Word Processing—Objective: to give novice users a practical background in word processing and its applications in the classroom, using a word processing package. (Offer December through April)

The parent training also serves to orient parents to the objectives of the project. It allows them to see the computer classroom and understand its organization. Use the opportunity to encourage parents to work as lab assistants on a voluntary basis. See Chapter 6 for more information about involving parents.

Step 4—Announce training sessions.

Give the staff sufficient advance notice of each session. Notify the participants with a personalized memo. Place announcements on the bulletin boards in the office and teachers' lounge well in advance of the session. Face to face invitations are very effective and are a good follow-up to a written message. Also, personal reminders from faculty members who are advocates of microcomputer use are very likely to increase participation. By the time your faculty commits to becoming a School of the Future, most teachers will be aware that some type of training is going to take place.

Let teachers and staff members know the prerequisites for the training. During the first year, the only prerequisite should be hands-on training. Many teachers probably have had this experience.

Target the audience when announcing the sessions planned. Invite the appropriate people for the topic. Offering the sessions on a volunteer basis will help you pick out the leaders in a project and will allow the project to run more smoothly.

Use a pre-registration system in order to anticipate the number of people to expect. In the case of inservice days, this lets the trainer know if additional sessions must be scheduled. Also, on inservice days, if there are several hours available, post a sign-up list near the employee sign-in sheet. Offer the same session in the morning and afternoon. This flexibility is appreciated by the teachers.

An effective means of communicating training schedules and course descriptions is through a staff newsletter produced periodically. This form of desktop publishing can also highlight outstanding classroom and administrative applications for the computer and useful implementation ideas contributed by the staff.

Step 5—Prepare for each session.

Some tips for having a good training session include:

- Have all materials ready early.
- Have room set up prior to workshop.
- Check hardware and software before session begins.
- Have large screen monitor and dry erase board available.
- Have a plan, and stick to it.
- Be familiar with all materials.
- Use visuals that are easy to read, and limit text visuals to seven lines of text or less.
- Identify audience and dress appropriately.
- Build confidence by addressing participants by name.

- Be courteous, polite, and businesslike.
- Never turn your back to the audience.
- Vary tone and activities during presentation.
- Keep focused, but lively.
- Circulate around the room when participants are working individually.
- Keep an eye out for participants who are frustrated, and help them.
- Watch your audience closely for nonverbal cues and respond to them.
- Anticipate questions and problem areas.
- Allow time for questions.
- Stress past learning, new learning and extension activities.
- Demonstrate the connection between computer and content areas (i.e., CAI).

Be sure that some form of evaluation is used to determine the effectiveness of each session. Either use verbal evaluation at the end of the session and document teacher input, or use a written form which is completed by each participant. It is recommended that a written evaluation be used every few sessions. The written approach provides more concrete data for research purposes; whereas, the verbal approach is more appropriate for self-improvement purposes.

Train only with materials that are available for use at the school, so teachers can immediately apply what they learn in their training sessions.

Consider previous training of staff members in planning for, and carrying out instruction. Stay away from technical jargon during the initial training sessions. What seems simple to do on a computer to the instructor may seem very complicated to a training session participant. Remember that some staff members may be totally unaware of computer operations and computer vocabulary.

Step 6—Provide follow-up training and assistance.

In order to ensure that teachers have adequate knowledge of the various computer applications, offer individualized follow-up training. This can be accomplished in a variety of ways:

- (1) Individual assistance from the trainer during the teacher's planning period.
- (2) Individual assistance from a fellow teacher who has successfully mastered the computer application being addressed.
- (3) Individualized instructional modules designed for use during the teacher's planning time or before or after school.

Step 7—Issue computer hardware and software to teachers who have gained proficiency in computer use.

The first group of teachers to receive computers for classroom use will be those who complete training and show a high level of proficiency in computer applications. The amount of training successfully completed and the appropriateness of the person's teaching area are key factors in determining which teachers will begin integrating computers into their classrooms.

The support staff also must show some level of interest and proficiency before computers can be a permanent part of their work environment.

The topics that must be mastered by School of the Future teachers who wish to use computers during the first year of the project are as follows:

- care and handling of diskettes
- proper safety precautions regarding power cords
- care and handling of hardware
- loading paper into the printer
- recognizing common disk loading problems
- identifying computer limitations
- identifying the computer's potential
- checking connections between computer and peripherals
- understanding basic computer terminology
- identifying special keys on the computer keyboard
- knowledge of software and its instructional applications

These skills can be placed on a checklist that each individual can maintain privately to check progress throughout the year and to build confidence.

Conclusion

Staff training will have its positive and negative aspects. Difficulties will arise from the lack of experience of the staff which will dictate the need for long and intense training sessions. These sessions may prove to be too much for some staff members and, therefore, could cause animosity. An initial period of getting acquainted with the machine and hand-holding is essential. Getting teachers interested will be a small task when compared to helping them find the time for the training sessions.

The material taught at first is not content specific, making training sessions easier to conduct. This means that practically everyone will be learning the same skills at the same time. This will encourage peer tutoring on the part of the staff. Staff members can use each other as computer resources and benefit from each other's experiences. As the year progresses, topics can get more specialized. These sessions will require more planning time and more materials to make them successful. The new topics will also require the instructor to be well-versed in a great many software packages.

CHAPTER 4

ORIENTING THE STAFF

F. M. Black Middle School was supplied with 200 Apple IIe computers and ten Macintosh computers as part of the Apple Classroom of Tomorrow project (ACOT). A staff handbook was developed to assist in the orientation of the teachers in F. M. Black's School of the Future project. Following are key selections from the handbook which can serve as a model for similar publications designed for faculty and staff at other schools.

Hardware Guide

Apple IIe—The Apple IIe is called a personal computer. This means that it is inexpensive enough for purchase by individuals and is meant to work independently of large computers, such as those that keep records for large corporations or guide the flight of NASA rockets. Even though the computer may appear to have a brain, it does not think. It follows instructions. It performs its task so quickly, however, that it often appears to be doing many things at once or to be thinking.

Depending on the program selected, the computer is capable of presenting new or remedial information, quizzing the student on the information presented, giving appropriate feedback regarding the student responses, and recording the student's scores. It can also produce documents, signs, puzzles, and a variety of instructional or motivational materials. The computers at Black are equipped with either one or two disk drives. One drive is sufficient for most educational purposes, but two drives are more convenient when using productivity software such as *AppleWorks*. The computers are equipped with either color or monochrome monitors. Printers are attached to some of the computers.

Macintosh—This computer is a more powerful personal computer than the Apple IIe. It is used mainly for administrative purposes at F. M. Black, but is also used to produce some instructional materials, as well as for direct instructional purposes. The Macintosh is a graphics-oriented computer that some people find easier to use than most other computers.

ImageWriter II Printer—This is the type of printer connected to many of the computers at F. M. Black. It is a very versatile printer capable of printing up to 250 characters per second. These devices can also produce a type style that is close to typewriter quality, although it does so at a slower speed. The printer can use single sheets of paper, ditto masters, or pin-feed computer paper. With some practice, you should be able to select the print quality and load the printer with paper easily.

Laser Videodisc Players—Videodisc players connect to television monitors to play back special optical discs containing slides, moving pictures, and sound. The action can be sped up, slowed down, or frozen with very little distortion, making the videodisc players very versatile. At present F. M. Black has about a dozen videodiscs covering various topics.

Pointing and Drawing Devices—There are a number of input devices that can be connected to a computer to help the user draw pictures, make selections, or even play games. These include the *Koala Pad*, by Koala Technologies, which is mainly used for art production. Another input device is the Apple mouse. The mouse can be used for graphic production or for indicating position on the monitor. The joystick is also available at F. M. Black. It is frequently used for playing games, although some drawing and educational programs use it too.

Computer Room Configurations

There are currently three non-networked computer labs at F. M. Black. Each lab is slightly different from the others, and the teachers consider the differences when planning for computer lab time. By becoming familiar with the lab descriptions and procedures on pages 21-27 of this chapter, you can get an idea of how to set up various types of computer labs.

Room 103

This room has twenty-eight computers and eleven printers. Every computer has two disk drives. There is a mixture of color screens and green phosphorus monitors. Room 103 is a general-purpose computer room, meaning it can handle most word processing needs and also computer-assisted instruction, including many of the MECC packages. If you are using word processing with your students, this room may not have enough printers to let everyone print his or her work during one period. You must plan enough time for students to transfer their disks to a computer with a printer. If this is not possible, students can save their work and then you can sign up for Room 115 on another day to allow students to print their work. The green phosphorus monitors will probably not be adequate if the software relies heavily on color. You should review the software on a computer with a green phosphorus screen and see whether it should be used. Room 103 also contains a large-screen monitor and a dry-erase board suitable for whole-class instruction.

Room 115

This is the best-equipped of the three labs. It has thirty computers and fifteen printers. All thirty computers have color monitors and two disk drives. Printer switch boxes enable two computers to share one printer. All students can print their work. They only have to wait for their neighbor to finish printing, push the button on the switch box that corresponds to their computer, and begin printing. This lab is suitable for any instructional or tool software. Because of its flexibility, this lab is usually reserved well in advance. Plan early to avoid disappointment. The room has a large-screen monitor and a dry-erase board.

Room 205

Room 205 has twenty-five computers and five printers. The number of computers has been limited because of the size of the room. All of the computers have color monitors, but only fifteen of them have two disk drives. The computers are placed along the edge of the room so that the teacher can easily see each student's monitor. The lab is well-suited for computer-assisted instruction. Word processing can be done, but printing takes a long time due to the limited number of printers.

Computer Lab Sign-Up Procedures

In the main office, locate the clipboard with the label "Computer Lab Sign-Up." The clipboard has a page for each day of the week, one section for each computer room, and one line for each class period of the day. Decide on the appropriate room, and write your name on the lines of the class periods during which you will use the computer lab. (See Figure 1.) Please be accurate when filling in the form. If at all possible, sign up at least a week in advance. Sometimes labs are available at the last minute, but as more teachers become involved in computer use, this will be the exception.

Day _____ Date / /

ROOM 115	TEACHER
Tutorial Period	
1ST PERIOD	
2ND PERIOD	
3RD PERIOD	
4TH PERIOD	
5TH PERIOD	
6TH PERIOD	
7TH PERIOD	

Figure 1. Portion of Computer Lab Sign-Up Sheet

An alternate method of signing up for the computer lab is to notify the coordinator about your choice of day and time. The coordinator will reserve the days and times you request if they are available.

Things to Do with the Computers in Your Classroom

A computer is a very powerful tool. Here are a few suggestions that can help you and your students get the most from the computers.

- *Use the computers appropriately.*

This does not mean that a student should spend seven hours a day at the keyboard. It simply means becoming aware of what computers are good for and using them when they will do the most good. Don't be afraid to make mistakes at the computer. See mistakes as part of your own learning process.

- *Practice keyboarding.*

Many programs that offer fun ways for students to improve their keyboarding skills are available. For example, have students record their scores from keyboarding software games and have friendly competitions during homeroom or other "free" times. See whether you can improve your own keyboarding skills. Good keyboarding skills are essential for getting the most from a computer.

- *Learn to program.*

The Apple IIe has a built-in programming language called Applesoft BASIC. Many programming books are available, so you can learn to give the computer instructions. Students learn the fundamentals of programming in computer literacy classes. Let them practice and refine their programming skills.

- *Use word processing.*

Keep a word processing program on hand, and let students use it to complete assignments. Be sure to load it into a computer that's connected to a printer for convenience.

- *Use databases.*

Publishers are always coming out with new data disks that support their database software and allow students access to various types of information. Students can also create their own database file formats based on classroom assignments.

- *Use spreadsheets.*

Spreadsheets can be used to promote problem-solving, make predictions, and stimulate mathematical thinking. Almost any subject area can make use of spreadsheets.

- *Use thinking-skills software.*

Always keep on hand software packages that require students to use high-level thinking skills. These programs often have a game format, which, in addition to making students think, are fun to use.

Things Not to Do with the Computer in Your Classroom

- *No unauthorized games allowed.*

Some students bring unauthorized copies of disks to school. These disks usually contain arcade-style games that have been illegally copied. You can usually tell that these disks are illegal copies, because they do not have a commercial label on them. Instead, the label will often contain the handwritten name of the game and the student. This can be a reoccurring problem since the disks can be duplicated easily and usually reappear in a week or two. Watch out for the students who persist in this illegal activity. Let them know that possession of illegal disks is against school rules and will be dealt with accordingly. However, games purchased legally may be played at the teacher's discretion.

- *No horseplay.*

Students must not pound on the keys, open the computer, rearrange the keys, or in any way dismantle the computer. The computers are rugged, but they have limits. Eating or drinking near the computers is also prohibited.

Hints for Teachers:

- Always preview the software you are going to use.
- If students are working with a package for the first time, keep the manual handy in case problems arise.
- Always have initial software activities balanced with other activities. Forty-five minutes of the same drill-and-practice software can be boring for anyone.
- Organize materials, and designate a student to keep track of them.
- For security, have an end-of-class checklist. Allow time at the end of the period for using it.
- Set up alternative plans for days when you are absent and have reserved a computer lab.
- Keep records of student activity at the computer. You are accountable for the time your students spend at the machine.
- Do not cover the computers with plastic. Moisture can collect inside and destroy circuits.
- Do not put write-protect tabs on every disk. Use them only when necessary.
- Never leave disks unattended. They tend to disappear.
- Check the caps-lock key if a student can't seem to get a program to work. Some programs require the key to be in the down position.
- Check the power switch on the printer, and turn it on before you try to print anything.
- Do not touch the inside of the computer unless you have turned the power off and know exactly what you are doing.
- Don't panic if the printer paper jams. Turn the printer off, remove the jammed paper, rethread the paper through the sprockets, and turn the printer on again.
- If you are working with labels, always roll them forward, never backward, in the printer. They can become loose and stick underneath the printer carriage.
- With programs that have management systems, always indicate which student records are on the disk. More importantly, knowing how the student name is recorded on the disk will often alleviate "name not found" messages.

Resources for Teachers

These are only a sample of the many books available:

- *Computer Strategies for Education* by Charles Kinzer, Robert Sherwood, and John Bransford. Merrill, 1986.
- *Computers in Teaching Mathematics*, by Peter Kelman, et al. Addison-Wesley, 1983.
- *Courseware in the Classroom* by Ann Lathrop and Bobby Goodson. Addison-Wesley, 1983.
- *Intelligent Schoolhouse: Readings on Computers and Learning*, edited by Dale Peterson. Reston, 1984.
- *Kids and the Apple* by Edward Carlson. DATAMOST, 1982.
- *Megatrends* by John Naisbitt. Warner, 1982.
- *Mindstorms* by Seymour Papert. Basic Books, 1980.
- *My Students Use Computers* by Beverly Hunter. Reston, 1983.

Magazines about computers:

- *Classroom Computer Learning*
- *Computers in Math and Science*
- *The Computing Teacher*
- *Electronic Learning*
- *Electronic Education*
- *Family Computing*
- *Infoworld*
- *Media and Methods*
- *Teaching and Computers*
- *Technological Horizons in Education* (T.H.E.)

Conferences and conventions:

- Texas Computer Education Association (TCEA) sponsors area and statewide meetings.
- The National Educational Computing Conference (NECC) annual meeting
- Minnesota Educational Computing Consortium (MECC) annual meeting
- International Association for Computers In Education Conference
- Association for Educational Communications and Technology Conference

Many specialists in curriculum areas such as math, special education, or language arts hold their own national meetings. Dates, times, and locations of many conferences can be found in the monthly journals listed above.

Electronic databases and bulletin boards:

- *BRS*, 1200 Route 7, Latham, New York 12110
- *CompuServe*, 500 Arlington Centre Blvd., P.O. Box 20212, Columbus, Ohio 43220
- *Dialog Information Service*, 3460 Hillview Avenue, Palo Alto, California 94304
- *The Source*, 1616 Anderson Road, McLean, Virginia 22102
- *WILSONLINE*, The H. W. Wilson Company, 950 University Avenue, Bronx, New York 10452

Free or inexpensive products:

- Apple Puget Sound Program Library Exchange (A.P.P.L.E.), 21246 68th South, Kent, Washington 98302
- *EA Software Source*, a quarterly newsletter, Educational Activities, Box 392, Freeport, New York 11520
- Minnesota Educational Computing Consortium (M.E.C.C.), 3490 Lexington Avenue North, St. Paul, Minnesota 55126
- *SOFTSWAP*, Steele Publishing, Box 271704, Concord, California 94527-1704
- *Software for Pennies*, contains lists of Apple clubs which distribute public domain programs for a fee, Warner Books, 666 Fifth Avenue, New York, New York 10103

Professional educational organizations relating to technology:

- Association for Educational Communication and Technology (A.E.C.T.)
- International Council for Computers in Education (I.C.C.E.)
- International Association for Computing in Education (I.A.C.E.), formerly the Association for Educational Data Systems (A.E.D.S.)
- Texas Association for Educational Technology (T.A.E.T.)
- Texas Computer Education Association (T.C.E.A.)

Many curriculum areas such as math, special education, or language arts have special-interest groups relating to technology.

Institutes of higher education in the Houston area that offer advanced training in computer education:

- University of Houston
- Houston Community College
- University of St. Thomas
- University of Texas School of Health Sciences

Other sources of information include public and cable TV programs and vendor support personnel.

Software Distribution Guidelines

Over 250 different software packages are currently available at F. M. Black. Due to the fact that computers in the laboratories at F. M. Black are not networked, a software distribution system was created.

Sorting through 250 packages can be quite a task. The teachers must refer to the School of the Future Recommended Software List for titles, quantities, and descriptions available for their particular subject area.

Of the 250 packages only a small percentage of titles is supplied in class sets. Hence, there is not enough software for all teachers to keep class sets of their own or even to keep a few copies of certain packages for the entire school year. The software has to be circulated as much as possible, so everyone has an equal chance to use it. The check-out system for software is similar to the one in a library but less restrictive. There are no fines, due dates, or cards to sign. The teachers simply submit a request to the coordinator, either orally or in writing, for the packages along with the date the teacher needs them. Then they go to the coordinator's office to get the packages, or wait for them to be delivered to their room. The coordinator keeps a database of everything checked out and corresponding serial numbers. From time to time a list of software the teachers have checked out is made available, so they can keep track of their inventory.

The teachers can keep the software for as long they like, even during the summer. If another teacher requests the same package, the teacher with that package is asked to return it, provided that it is not currently in use. If there is a conflict, the software is given to the person who requested it first.

Once checked out, a software package becomes the responsibility of the teacher. Teachers are encouraged to take inventory of the software they have at the beginning of the day and again at the end of the day. However, the most effective means of tracking inventory is to check software at the end of each class period. Some packages are very enticing to students and have been known to "disappear." Although the teacher is not financially responsible, he or she is encouraged to make a diligent effort to recover lost software, which should be reported immediately to the coordinator. There is no budget allocation for replacement software, so once it is gone, it is gone for good.

CHAPTER 5 PROVIDING EQUITY

Equal access to computers is a goal for every school district. Equal access applies not only to students but also to teachers, administrators, and parents. Inequalities are based on differences in sex, race or ethnic background, socio-economic status, home environment, handicapping conditions, and other factors.

Steps to Equity in Computer Access

Innovation brings with it certain inequities. Evidence indicates that the use of computers in the classroom is no exception. These guidelines, developed and implemented at F. M. Black Middle School, will encourage equity in computer access so that students are not denied full use of computers because of sex, race, economic level, or educational ability.

1. Include all faculty members in training sessions.

All faculty members should be invited to initial computer training sessions. These sessions focus on the use of software packages that can be applied to any discipline. Familiarity with the computer is essential, so teachers will feel secure in using computers and eventually in using the computer in their subject area. Once general knowledge has been gained, all faculty members should be encouraged to specialize by completing training sessions covering the subject areas they teach. Department heads should also be encouraged to attend training sessions. The presence of these instructional leaders encourages participation by teachers.

By having female teachers well versed in the use of computers, the school will develop appropriate role models for female students. These positive female role models help in overcoming the misconception that men are more adept at utilizing computers.

While all students benefit from positive role models, special education and low-achieving students, in particular, benefit from teachers who are adept at computer usage. These students are commonly denied access to computers and profit from teachers who expose them to suitable software programs.

In addition to instructional staff, all administrative and clerical personnel should receive training on the equipment and software packages that apply to their jobs. Numerous tasks within the school setting should be computerized. (See Chapter 8.) This will save time and increase staff access to a variety of information.

2. All students should be exposed to computers in at least one learning situation.

By integrating computers into almost all subject areas within the overall school curriculum, every student will be exposed to computers. The amount of exposure will depend on the degree of computer usage each teacher determines appropriate. Teachers should have a complete list of software available and be informed when new packages are added to the list. In addition, training or assistance with any new software package should be provided. Consequently, teachers should be able to provide more computer time for students. Students with an intense interest in computers should be given additional opportunities.

3. Select software on the basis of its appeal to both sexes, all economic levels, and all ethnic groups.

In order to reach all students, make available a wide spectrum of software. Software packages that appeal to both sexes should be available, as well as software that is helpful to and appropriate for the various economic levels and career orientations represented in a student body. Packages appropriate to the various ethnic groups that make up a school's population should also be considered in software selection.

4. Choose software that appeals to all levels of students.

Choose software with all levels of academic achievement in mind. Software below, at, and above grade level should be available. A number of remedial instruction software packages should be available for use in tutorial classes. These may address the objectives covered in state competency tests and give the students many hours of valuable activities. Include motivational software packages that appeal to the high-ability student with a low interest in learning. Often these packages are appealing to the student who has not been reached by the regular educational program. Application packages, such as word processors and databases, can be used with all students, regardless of their achievement level.

5. Have computers in the library available for student use.

Place computers in the library and allow students to use them before and after school, and during lunch periods. An experienced and enthusiastic computer-using librarian can make numerous software packages available and provide technical assistance when necessary.

6. *Provide extracurricular computer activities for students.*

An extracurricular computer club should be available for any interested student. Hold regular meetings at which students are exposed to new activities and experiences using computers. Make an effort to involve girls and minority students in the club.

7. *Offer parent training sessions.*

In order to involve parents in the education of their children, offer computer training for parents. These sessions can be scheduled in the evenings and Saturdays, depending on the preferences of the parents involved. (See Chapter 6.) The purpose of these sessions should be to introduce parents to the technology being used in the classroom. Parent training results in more parental interest in computer education both at home and in the school environment.

8. *Involve teachers of Special Education.*

All teachers of Special Education should use the computer for instruction on a weekly basis. Computers provide an ideal way of providing one-on-one instruction to this group of students with diverse needs.

9. *Infuse computers into the curriculum.*

Make computers a natural part of lesson plans. Every effort should be made to ensure student access to computers to support the instructional process. Make certain that there is little chance of irrelevant prerequisites or other barriers that will restrict students from using computers.

CHAPTER 6 INVOLVING THE COMMUNITY

Involving parents in an innovative educational program such as F. M. Black's School of the Future takes extensive planning on the part of staff members. This initial planning time is amply rewarded. For example, as parents become knowledgeable about the changes taking place within the school, they become more enthusiastic about their children's education.

Eventually parents should become aware that one way to improve their child's study skills is to assume an active role in the learning process. Those parents who show an interest in schoolwork and encourage their child to study are communicating respect for education and an expectation for success.

Providing parents with training on the microcomputers that their children are using in the classroom stimulates parent-child interaction. Also, when computer programs feature a design for teaching based on sound educational principles, parents with no teaching background can work successfully with their children using the computer, especially if one is available at home. Both children and parents benefit from the experience.

Suggested goals for parent training in educational computing are:

- improvement in the learning environment at home
- increased communication among teacher, parent, and child
- equalization of educational opportunity
- promotion of computer literacy
- motivation of students to learn
- increased active, rather than passive, use of leisure time
- stimulation of cognitive development
- increased instructional time
- reinforcement of basic skills
- development of writing skills

Methods for Parent Training

Circumstances within a school or community may dictate the use of different training strategies. The availability of trainers, facilities, equipment, and other resources will also influence the training strategy employed. For instance, F. M. Black Middle School has the facilities and resources to conduct its parent training in a classroom environment like the one used by the students.

If group instruction for parents is not feasible, the school can implement computer-based instruction as an effective method for training individuals on their own time and at their own rate. Several software programs have been designed to lead new users through general operation and specific applications of the computer. Word processing, spreadsheets, databases, and communications software are types of programs that can be learned with this kind of instruction.

Another option is video-based training which can be used effectively with either individuals or groups. A video training program can be very productive and can be used numerous times at little cost. One constraint, however, is the availability of video resources.

Filmstrips, slide/tape programs, videotaped productions, and other audiovisual materials to support the training program can be purchased, rented, or borrowed from a variety of sources. Frequently school districts, community colleges, local universities, city libraries, or regional education service centers will be rich sources of materials.

Getting Started

Careful planning is required to conduct successful parent training sessions. Parental needs and schedules must receive consideration before topics and sessions are scheduled. Take the following steps before conducting training sessions.

1. Survey needs.

The training coordinator should meet with selected parents and identify the reasons that parents are interested in computer training. At F. M. Black it was found that parents wanted:

- to promote personal growth
- to maintain a relationship with their children through common knowledge and experience
- to volunteer time as lab assistants and become more involved with the educational process

2. Set times and dates.

Probably the most difficult aspect in offering computer training to parents is determining the best time for sessions. Weekday evenings or Saturdays were best at F. M. Black. Due to the large number of single-parent homes and homes in which both parents work, parents have limited time to spend in training sessions during the school day.

Good training must allow sufficient time for noticeable progress to be made within an individual session. The recommended time frame for weekday sessions is a two-hour session twice a week. In the past, the sessions at Black Middle School have been scheduled from 4:00 to 6:00 p.m., but 6:30 to 8:30 p.m. or 5:30 to 7:30 p.m. may be more convenient for working parents. Weekend sessions can be scheduled from 9:00 a.m. to 4:00 p.m. with an hour lunch break. Trainers for the sessions should be well-prepared, and all equipment must be in good working condition when parents arrive.

3. Send letter to parents.

The training staff should distribute a brief memo to inform parents of the classes being offered. The message can be taken home by the students.

4. Advertise on the school marquee.

The school marquee can display the dates and times of the computer training. Although, many people may see the sign and inquire about the training, try to limit the training to parents with children enrolled at your school. You may of course open training to parents of children at other schools if your resources permit.

5. Collect registration forms.

Students may turn in their parents' registration forms to the school office. These forms can be used to create name tags for all participants. Three days before the session, the training coordinator should phone all registrants, thank them for their interest in the program, and confirm their registrations. This phone call serves as a friendly reminder to attend the training session.

Training Topics

Basic computer training for parents should cover the following topics:

1. Computer concepts

Parents are introduced to the basic computer concepts that students are learning in school. Explanations of computer terminology provide parents with a common understanding for communicating with their children about the computer. The internal parts of a computer, the components of a computer system, hardware, software, peripherals, and other topics are discussed and clarified, just as they are in computer literacy classes.

2. Types of software programs

Software that enables the computer to be used as a tool to increase productivity is introduced. Word processing, spreadsheets, databases, and electronic communications software packages are described and demonstrated. Parents are also introduced to software used for computer-assisted instruction, remediation, enrichment, and drill and practice.

3. Hands-on experience

Since each participant ideally has a computer for use in the classroom, there are ample opportunities for parents to become familiar with the components of the computer configuration, keyboard, monitor, disk drives, printers, diskettes, and various types of software packages. Instructional time is limited to six hours, but this was sufficient for sampling some of the easier software applications.

4. Word processing

One goal of the parent training is to give each participant the opportunity to use a simple word processing program. At F. M. Black, *FrEdWriter* was chosen because it is a public-domain program that may be duplicated for the cost of a diskette after initial purchase by a school. It is easy to use and can be taught in the time available. Original copies of the software are available from the San Mateo County Office of Education, 333 Main St., Redwood, CA 94063. Teacher-developed lessons using *FrEdWriter* are also available at the same address.

The following agenda may be used:

9:00 a.m.— 4:00 p.m.

- I Introductions
- II Parts of the Computer
- III How to Handle Software
- IV Loading the Computer
- V *Apple Presents Apple* (on-line tutorial)
- VI Inside the Computer
- VII Types of Software
- VIII A Look at the System Master
- IX Initializing a Diskette
- X Productivity Software/*FrEdWriter*
- XI Using File Utilities

Conclusion

Whatever the approach to parent involvement in computer education, the important thing is to develop a plan that will reach the greatest number of parents. Parental involvement can have positive effects for students, parents, schools, and community. It is certainly worthwhile to plan for and encourage this kind of project.

CHAPTER 7

PREPARING THE BUILDING FOR TECHNOLOGY

At F. M. Black Middle School, a great deal of thought and planning went into structuring classroom environments to incorporate computer configurations. Although network hardware and software was not made available to F. M. Black it was recognized that the ideal computer implementation should be based on software that integrates with and supports the school's curriculum, student needs, and specialized applications.

Three fully equipped computer laboratories and twenty-eight classrooms containing individual computers have been implemented at F. M. Black Middle School for instructional purposes. In addition, computers are located in the school library for student use and in offices and teacher work areas for administrative purposes. Once the general placement of the computers was determined, measures were taken to ensure proper wiring and security for all areas that were to contain equipment.

The following are the steps that were taken to ensure proper installation and maintenance procedures for an effective implementation.

Step 1. Determine the total number of computers needed for the program.

At F. M. Black a ratio of one computer for every five students was found to allow for adequate computer time with the software currently available. The ideal, non-networked, implementation would supply every teacher with one computer and classroom management software. Hence, a formula can be derived to determine the amount of computers necessary for successful technological enhancement of the school: $(1,200 / 5) + 65 = 305$. $[(\# \text{ of students} / 5) + \# \text{ of teachers} = \text{total } \# \text{ of computers}]$. At F. M. Black, the actual number of computers available for instruction was 240. Therefore, the decision was made to use the computers primarily for instruction rather than to provide every faculty member with his or her own computer.

Step 2. Determine specifications for computers.

Program needs and software requirements will determine the following specifications for computer equipment:

- amount of random access memory (RAM) necessary
- type of monitor (monochrome, color, 40- or 80-column text capability)
- keyboard types (detachable, ten-key, raised or flat keys, etc.)
- number and kinds of peripheral devices (mice, printers, additional disk drives, joysticks, modems, etc.)

Step 3. Determine the distribution of the computer hardware and locate on a master chart the classrooms that will be designated for computer use.

The equipment configurations, laboratory or classroom, ultimately depend on the types of activities planned. Initially, it may be difficult to determine exactly where each piece of equipment should be placed. Careful planning of both short-term and long-term goals from the beginning can save substantial money and effort. Areas designated for moderate to extensive computer use often require considerable extra wiring.

- Computers should not be placed near chalkboards or other areas where dust accumulates.
- Temperature must be controlled to maintain an environment between 60 and 80 degrees Fahrenheit.
- Room humidity should be maintained between 45% and 55% and rooms with tiled floors (as opposed to carpeting) selected to minimize the build-up of static electricity.
- Computers should not be located against or under windows. All windows should be equipped with shades or blinds for reducing glare.
- Security precautions must be developed for computer labs and classrooms. Second-story or windowless classrooms should be chosen if possible.
- Room selection may be affected by modem use and the installation of dedicated phone lines.

Step 4. Provide for maintenance.

An insufficient budget for computer repairs and upgrades can result in the failure of an entire program. Repair turn-around should be under 48 hours. Once warranties expire, schools can choose from several options for computer maintenance.

- service contracts with local vendors (on site or at local service centers)
- in-house technicians
- factory repair (Shipping expenses and the time factor should be considered. Service by local vendors is preferable to shipping to the factory for repair.)

Step 5. Select the appropriate hardware for your instructional and/or administrative needs.

One of the most important parts of the purchasing process is a demonstration of selected equipment. Refer to the list of specifications (Step 2), and make certain the demonstration covers all necessary features. The vendor should cover the following questions in the demonstration.

- Will the system be able to use the software that has been identified?
- How long has the company been in business?
- How many installations of the computer system being demonstrated have taken place overall, and how many specifically in school systems? Do you have permission to contact an installation site?
- Is the computer system well made? (For example, What is the break-down rate otherwise known as the "mean time between failures?")
- Is the computer easy to use?
- How expandable is the computer?
- Does the manufacturer supply helpful manuals?
- What will the system cost?
- Are there any hidden costs?
- What kind of warranty is offered? What are the constraints of the warranty (e.g., time, parts/labor covered, on-site vs. mail-in)?
- What kind of impression do the people demonstrating the system make?

Step 6. Order computer hardware.

Since budgeting is completed before the start of the school year, equipment will already have been selected. All that remains is to place the order for the equipment. Be sure to allow enough time in case there are problems in filling the order. Computers and peripherals should be ordered as early as four months before installation. Also, allow sufficient time for the installation of the equipment. It is important that qualified technicians, assigned by the vendor if possible, be scheduled to carry out the installation. (See Step 9.)

Step 7. *Design, schedule, and install wiring for all classrooms designated for computer use.*

Wiring should be done early in the process, so potential problems can be resolved before the hardware arrives. Classroom configuration maps should be prepared and referred to when outlet placement is being completed. The electrical current requirements must be determined for each computer and its peripherals. In classrooms, track wiring should be on the wall away from foot traffic.

For computer labs, there are two options. One is to install wiring all along the walls, so computers line the walls. The advantage of this setup is that the teacher can see all student monitors from one vantage point; the disadvantage is that it takes a large room to accommodate 25 or 30 computers, printers and student work areas.

The other option is to place computers in rows. This configuration takes up less space and leaves more room for peripherals and work areas next to each computer. Drawbacks are that wiring and cables will be exposed to foot traffic, and teachers cannot view all student monitors from one vantage point.

Step 8. *Determine security needs for computer classrooms, and install necessary security devices.*

Certain classrooms are more vulnerable to break-ins and vandalism than others. Rooms on the first floor, especially those with many windows, and rooms in temporary buildings or annexes are more likely to be burglarized. These types of rooms should be avoided when choosing computer classrooms. Some security devices to use are:

- heavy metal screens or burglar bars on the outside of windows
- alarm systems—motion detectors
- extra-heavy-duty locks on classroom doors
- locking devices on computers, peripherals, and computer tables
- unique computer room key and lock rather than the regular master key and lock
- identification tags with numbers assigned by the district
- engraving tool

Step 9. Install computers in designated classrooms prior to opening of school.

Computers should be installed and tested well before classes begin. This gives teachers an opportunity to familiarize themselves with software and hardware. However, if the computers will not be used immediately, wait no more than four weeks before implementation to do the installation, since the majority of hardware warranties expire 90 days from the day of installation. Most electrical problems will occur during the first ninety days of use, so there is no advantage to unpacking the equipment and letting it stand idle through the warranty period.

Unpacking and setting up a basic Apple computer system takes the average skilled technician about 15 minutes. This includes checking the components to see that everything is functioning properly. This time will vary with other brands of computers.

When computers are not in use, there is a temptation to cover them with dust covers. This may do more harm than good, because the covers trap moisture inside the machines and may cause malfunctions, especially in humid climates.

CHAPTER 8 AUTOMATING THE SCHOOL OFFICE

The main goals for the administrative implementation at F. M. Black are paperwork reduction, efficient use of time, and higher quality of work. School personnel were interviewed to determine their particular needs using the computer for administrative applications. Training for administrative personnel was based on needs and previous computer experience. In the beginning stages, staff were trained on a need-to-know basis. As their computer experiences grew, they were able to expand their knowledge to include more in-depth use of the programs.

Four Apple IIe and six 512K Macintosh computers and printers were assigned to administrative personnel at F. M. Black Middle School. Since a computer network with appropriately designed administrative software was not made available to the school as part of the project, a variety of stand-alone packages was used. The following is a list of the administrative software applications at F. M. Black Middle School and the job category/person responsible for making use of the applications. It can serve as a model for other schools.

Person	Task	Machine	Software
Secretary	Discipline records management	Macintosh	<i>File</i>
Secretary	Form letters to parents and teachers	Apple IIe	<i>AppleWorks WP</i>
Secretary	E-Net communications	Apple IIe	<i>ERA2</i>
Secretary	Information bulletin to staff	Apple IIe	<i>AppleWorks WP</i>
Principal	Teacher assessment score averaging	Apple IIe	<i>(in-house program)</i>
Principal	Applelink communications	Macintosh	<i>Applelink</i>
Counselors	Student demographic information	Macintosh	<i>File</i>
Counselors	Tutorial scheduling management	Macintosh	<i>File</i>
Counselors	Student failing notices	Macintosh	<i>Multiplan</i>
Counselors	Career Day information	Macintosh	<i>File</i>
Records Clerk	Student transfers	Apple IIe	<i>AppleWorks DB</i>
Attendance Clerk	Labels for homeroom attendance	Macintosh	<i>File</i>
Attendance Clerk	Daily attendance bulletin	Apple IIe	<i>AppleWorks DB</i>
Attendance Clerk	Student absence notices	Apple IIe	<i>AppleWorks DB</i>
Data Proc. Clerk	Average daily attendance bulletin	Apple IIe	<i>D.O.T. Writer / ERA2</i>
Data Proc. Clerk	Teacher information files	Macintosh	<i>File</i>
Data Proc. Clerk	Form letters to parents	Apple IIe	<i>AppleWorks WP</i>
Finance Clerk	Textbook management	Apple IIe	<i>AppleWorks DB</i>
Librarian	Books on purchase consideration	Apple IIe	<i>AppleWorks DB</i>
Librarian	Overdue books	Apple IIe	<i>AppleWorks DB</i>
Sp. Ed. Supervisor	Individualized education plans	Apple IIe	<i>D.O.T. Writer</i>

Secretary

- Word processing

Letters to parents are among the most critical communications produced at the school. The secretary uses the word processor portion of *AppleWorks* to create form letters for parents and teachers. *AppleWorks* enables the secretary to keep many different form letters in memory simultaneously. The secretary also uses *AppleWorks* to create the staff information bulletin.

- Electronic communications

The *ERA2* program by Microcom is used to receive daily fanout messages from the Houston Independent School District (HISD) electronic network (E-Net) and to keep abreast of current information from HISD's Department of Technology, other administrators, and teachers in the district. The same program also sends attendance data to a mainframe computer.

- Discipline records management

Microsoft File is used to maintain student discipline records. This database records the names of all students sent to the office for disciplinary action. Users are able to sort the information by name, data, or offense.

Principal

- Calculation of scores on teacher assessment form

The Apple IIe is used to run a teacher assessment score averaging program developed in-house by Frank Salinas, the teacher technologist at F. M. Black Middle School. The principal or clerk can use this program, written in Applesoft BASIC, to quickly average teachers' scores.

- Electronic communications

The principal uses *Applelink*, an electronic communication network provided by Apple Computer, Inc., to communicate with other Apple Classroom of Tomorrow (ACOT) principals and with ACOT personnel in Cupertino, CA.

Guidance Counselors

- Student demographic information

The Macintosh is the computer used by the guidance counselors. A hard drive is available for storing large files of student information. *Microsoft File* is used by the counseling staff to organize the vast amount of student information. Databases containing student demographic information are set up by the teacher technologist and are used by the counseling staff on a daily basis.

- Scheduling tutorials

Counselors also use *File* to schedule and manage student tutorial periods. Although the counselors were shown how to create a file, the task of designing the file was the responsibility of the teacher technologist. Frank Salinas has designed many school databases and was able to set up each file so the most useful information was readily accessible.

- Student failing notices

Counselors use *Microsoft Multiplan* to create student failing notices. A small spreadsheet is used to generate notices to students who are at risk of failing a subject. It shows the minimum grade he or she needs to receive on the next major assignment to avoid failing.

- Career Day information

Microsoft File was used to create a Career Day database. This database was used to keep lists of speakers, room assignments, and produce name tags for the guest speakers.

Records Clerk

- Student transfers

Transfer applications must be renewed yearly. The school clerk uses the database feature of *AppleWorks* to track student transfers. This database allows students to be tracked over a three year period. It also provides space for comments to be recorded indicating approval or denial of transfer, home school, forms returned or outstanding, etc. Lists then can be sent to the transfer school.

Attendance Clerk

- Daily attendance bulletin

An *AppleWorks* database was created which contains the names and ID numbers of all enrolled students. The attendance clerk is able to mark a student absent simply by checking the appropriate field in the database. A daily absentee bulletin is produced and distributed to staff.

- Labels for homeroom attendance cards

The teacher technologist created labels for homeroom attendance from the student demographic database. The information stored on this database is used to eliminate the repetitive writing of demographic information.

- Word processing

Attendance clerks are required to send truancy letters to parents after a child misses four periods of the same class within a six-week period. These letters are produced with the *AppleWorks* word processing program. The attendance clerk fills in the parent names and address, student name, period number, course number, and absence dates. The letters are then sent home for parent signatures, while an extra copy is printed for the school files.

Data Processing Clerk

- Electronic communications

The Apple IIe is used by the data processing clerk with the *D.O.T.Writer* word processing program to create the average daily attendance report. This word processor allows the user to build text files containing information about new students, make changes in old student records, and record absentee information. The attendance clerk then uses the *ERA2* modem and software, developed by Microcom Communications, to transmit the *D.O.T.Writer* text files to the mainframe computer at the district's regional service center.

- Teacher information files

Teacher information files are maintained by the data processing clerk. These files are created using *Microsoft File* and contain basic demographic information.

Finance Clerk

- Textbook management

The finance clerk uses the *AppleWorks* database to track lost and found textbooks. The database keeps lists of student names and titles of books that were lost. Information can be entered daily or weekly. Lists can be sorted alphabetically by student name or book title. The total amount for each book is also provided.

Librarian

- Books under purchase consideration

An *AppleWorks* database is used to maintain a list of books which are to be considered for purchase as funds become available. The user is able to sort the information by title, author, or price.

- Overdue books

This information is managed using an *AppleWorks* database. Each week the librarian generates a list of students with overdue books. Copies of the list are then given to each homeroom teacher.

Special Education Supervisor

- Individualized education plans (IEP's)

IEP's are written using a master file of objectives stored in a *D.O.T. Writer* file. The user is able to delete any information not needed leaving a collection of relevant objectives.

Conclusion

Computer training is done by the teacher technologist and the School of the Future coordinator. Staff are trained for their assigned tasks, which are closely related. Care is taken to avoid duplication of effort such as keying in the same information more than once for any task.

CHAPTER 9 COMPUTING THE SCHOOL'S SCHEDULE

In a modern school, it is essential to have a student scheduling program. In-house student scheduling encourages peer tutoring and interdisciplinary teaching situations and helps to facilitate small as well as large-group instruction. A flexible student scheduling program gives the principal a powerful tool for making optimal use of teacher and facility resources.

Scheduling programs should delineate system capabilities and requirements as denoted under System Configuration and Program Parameters sections of this chapter. They should also have a majority of the features cited under flexibility, student information, course information, master schedule information, scheduling, and reports. The following specifications were created to meet the needs of F. M. Black Middle School as well as those of other schools.

SYSTEM CONFIGURATION

CPU	_____
Memory required	_____
Disk drives	Hard disk _____
	Floppy _____
Printer(s)	_____
Scanner	_____
Phone dialer	_____
Other	_____ _____ _____
Language	_____
Operating system	_____
Cost	_____
Number of systems installed	_____
User referrals	_____ _____ _____ _____

PROGRAM PARAMETERS

Maximum number of students	_____
Maximum number of courses	_____
Maximum number of sections	_____
Maximum number of periods	_____
Estimated time required to schedule 1000 students	_____
Estimated time required to schedule one student into an existing schedule	_____

FLEXIBILITY

Program interfaces:

with a network.	Y/N
with student records program.	Y/N
with grade reporting program.	Y/N
with attendance program.	Y/N
with other programs. (if yes, please specify)	Y/N

Program can:

be customized.	Y/N
----------------	-----

STUDENT INFORMATION**Program displays:**

pertinent student information, such as grade, sex,
special needs, etc. Y/N

previous courses the student has taken. Y/N

individual student schedule on the CRT. Y/N

individual student conflict matrix. Y/N

Program maintains:

number of credits per day and per week per student. Y/N

Program identifies:

students not meeting minimum course credit requirements. Y/N

COURSE INFORMATION**Program permits:**

a minimum length of six characters for a course number.
(Houston Independent School District requirement) Y/N

numeric and alphanumeric course numbers. Y/N

the linking of courses. Y/N

the scheduling of courses on alternate days. Y/N

user-defined constraints, such as sex or grade. Y/N

section counts when a student withdraws from school.	Y/N
courses to go across several periods even if the periods are not consecutive.	Y/N
courses to be year or semester.	Y/N
the notation to be entered for each course selection as to whether or not the course is an alternate course.	Y/N
setting of priority for courses.	Y/N
setting of maximum enrollment.	Y/N
manual override of restrictions such as grade, sex, and section number limits.	Y/N
automatic course selections (e.g., all 9th-graders take 9th-grade English).	Y/N
the moving of students, as a group, to different sections.	Y/N
entry of course credit.	Y/N

MASTER SCHEDULE

Program provides:

course request tally.	Y/N
list of students by requested courses.	Y/N
the number of scheduled and unscheduled students on trial scheduling runs.	Y/N

an abbreviated master schedule. Y/N

a conflict matrix of individual student requests on trial scheduling runs. Y/N

error condition if a section count is exceeded. Y/N

student course request verification. Y/N

Program identifies:

courses with no sections. Y/N

teachers with too few classes. Y/N

teachers with no planning period. Y/N

Program maintains:

section counts in real time and on-line when student schedules are entered or modified. Y/N

Program permits:

scheduling of students into the first semester of a two-semester course without having to count the two-semester course as independent courses in the master schedule. Y/N

user to save trial scheduling runs. Y/N

SCHEDULING

Program permits:

scheduling of student groups. Y/N

block scheduling of required courses. Y/N

the entry or modification of a student schedule on-line at any time. Y/N

scheduling of more than one semester/quarter at a time. Y/N

scheduling using prerequisites and corequisites. Y/N

simultaneous viewing of course and section data at the same time as on-line scheduling is being done. Y/N

continuous use of the on-line schedule, allowing the entry and modification of student schedules and maintenance of section counts. Y/N

the balancing of section enrollment. Y/N

the balancing of sections by either ethnic group or sex. Y/N

notating whether the course is required or elective. Y/N

scheduling into a specific section. Y/N

Program identifies:

unscheduled students. Y/N

courses which have no student enrollment. Y/N

Program delineates:

limits on the total number of students permitted to enroll for each course and section. Y/N

REPORTS**Program provides:**

individual student schedules.	Y/N
student verification lists.	Y/N
study hall lists.	Y/N
teacher schedules.	Y/N
teacher conflicts.	Y/N
course conflict matrix.	Y/N
room use reports.	Y/N
room conflicts.	Y/N
reports sorted by grade.	Y/N
reports sorted by student ID.	Y/N
reports sorted by student name.	Y/N
reports sorted by homeroom.	Y/N

When using the student scheduling checklist above, school administrators should first review the checklist items to determine which ones are relevant to their needs. Scheduling packages should then be reviewed according to the revised list.

CHAPTER 10

CREATING INSTRUCTIONAL MATERIALS

Introduction

This chapter suggests ways that software can be used to create instructional and motivational materials. The computers and software cited offer a relatively low-cost method of producing professional looking documents. This can include collections of students' work or teacher-produced handouts and work sheets. Software can also be used to create eye-catching posters that illustrate curriculum-based concepts and help students communicate effectively. Attractive overhead transparency masters, work sheets, tests, study sheets, posters, and signs can be created. Unlike some of the instructional software that covers only one objective and then remains on the shelf, these programs can be useful throughout the year.

Also in this chapter are lists of software that can be used to produce instructional print materials. In addition, there is a list of software that can accept information and use it to create lessons that deal specifically with the subject being taught. Other software is listed that can be used to create graphics for classroom use and to produce slide-show-like presentations on a TV screen.

Steps to Creating Effective Instructional Materials

Step 1: *Identify information.*

Identify the information that can be prepared for presentation most effectively through the use of computers.

Step 2: *Decide on key concepts.*

Decide what the audience should remember about the information you are presenting. Highlight that information in your presentation.

Step 3: *Identify audience characteristics.*

Determine the characteristics and learning styles of your audience (e.g., slow readers, gifted, visually impaired), and adjust your presentation materials accordingly.

Step 4: *Decide on the medium.*

Decide which medium you will use to present the information processed by the computer. If you are using transparencies, keep letters and graphics large enough so that no one has to strain to interpret them. Will you use a large-screen TV, copies from a copy machine, ditto masters, or copies made from a thermal master? Each one has its own constraints.

For instance, if you use a thermal machine, much of the fine detail will not be duplicated.

Step 5: Choose the format.

Decide on the format of the information to be presented. Be creative, invite others for brainstorming sessions, and look at publications such as childrens' magazines, books, etc. Record your ideas with sketches or notes.

Step 6: Refine ideas.

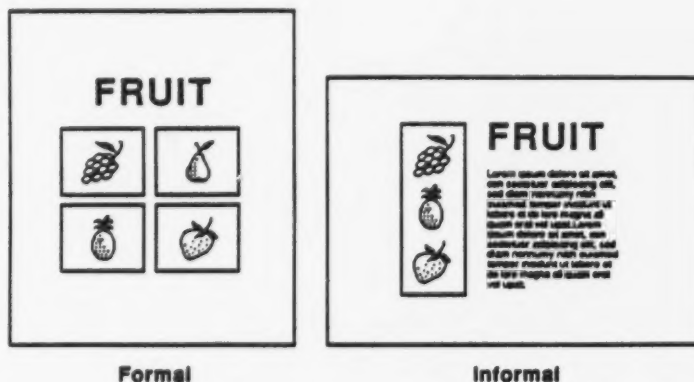
Take your best ideas and refine them. Keep the materials simple enough for the audience to grasp the main idea and to allow for ease of production.

Step 7: Implement and evaluate.

After using visual elements in your presentation, evaluate their effectiveness by seeing how well your students respond to the information and concepts presented.

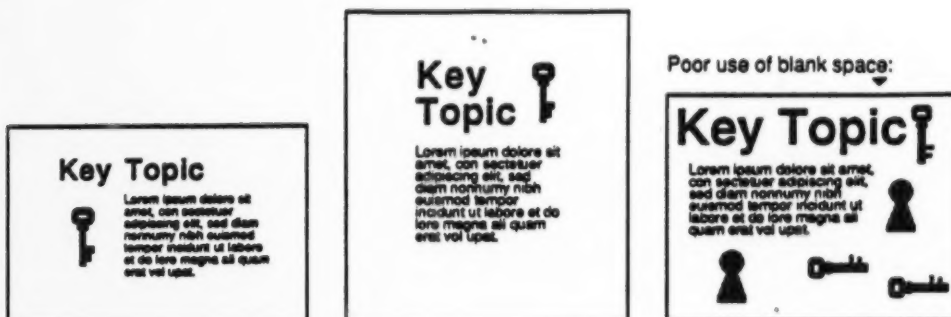
Fundamentals of Design for Visual Aids

Balance



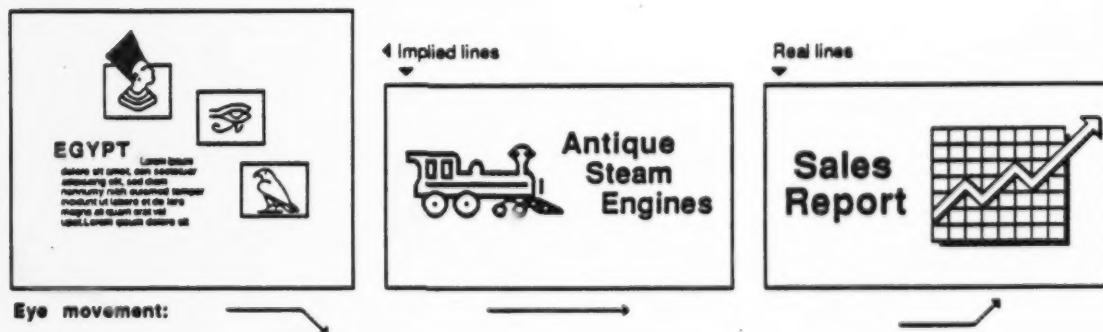
There are two types of balance—formal and informal. Formal balance usually means that the composition is symmetrical. Informal balance involves arranging items of unequal size or emphasis.

Unity



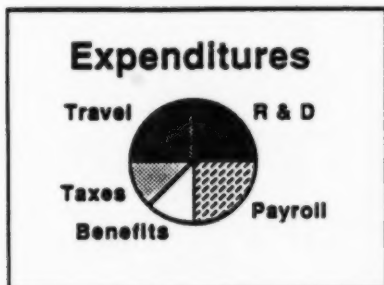
Use blank space around the objects to weld them into a compact whole.

Movement



Your audience tends to view things from top to bottom and from left to right. Make real or implied lines in your design fit this pattern.

Simplicity and Clarity



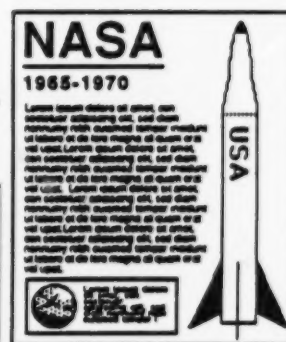
Too busy—confusing



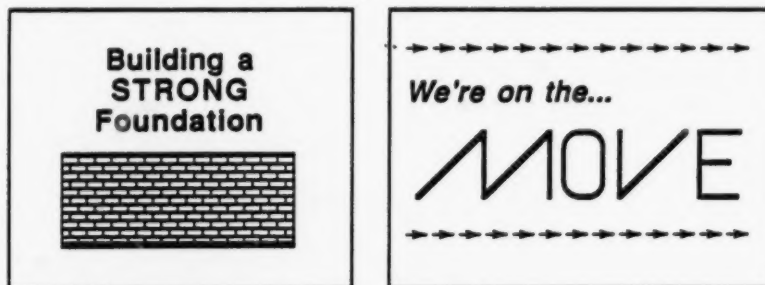
Keep it simple! Too many graphics in one visual will confuse the audience. Stick with a main idea or concept for each visual. To increase clarity, graphics should communicate the message clearly.

Tools for Design of Visual Aids

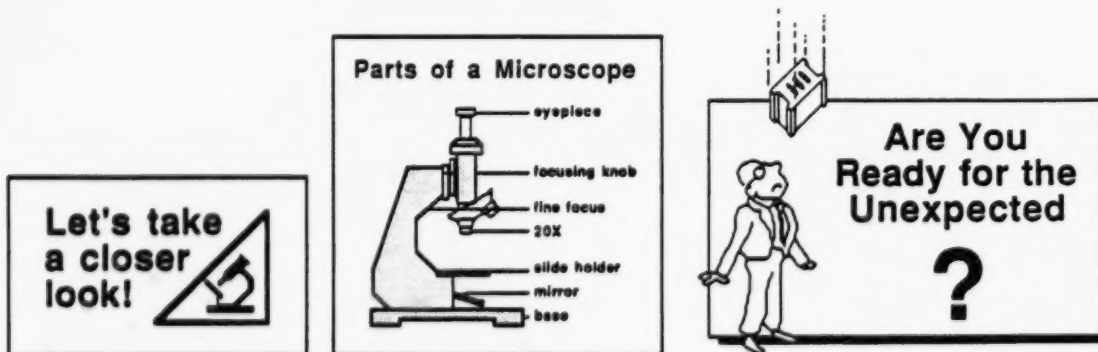
Space

Too crowded—
not enough
white space

The white space around your visual is just as important as the visual itself. If there are too many items on a page, they detract from one another and are hard for the audience to remember.

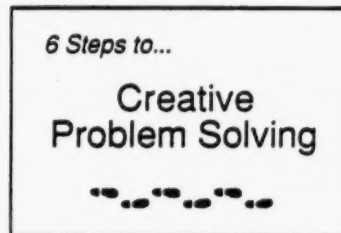
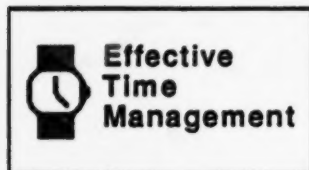
Line

Lines can lead the viewer along a carefully planned path. Using vertical and horizontal lines implies strength and structure, while diagonal lines suggest action and movement.

Shape

Shapes can be detailed depictions of objects or just an outline. Use what fits your topic the best. Exaggerated shapes and cartoons tend to hold an audience's attention longer.

Size



To attract attention, make the most important object in your visual the largest, even larger than things that are normally associated with it.

Color

Coloring overheads and other visuals can give them added impact. Color can be used to emphasize key words or topics. Used wisely, color can make the visual more attractive to the viewer and offer a change of pace.

Nine Rules for Producing Effective Visual Materials

1. Each visual should be limited to one main concept or idea.
2. Decide what your audience should know or feel after seeing the visual, and design the visual to achieve that effect.
3. Target your audience with graphics that will appeal to them.
4. Keep it simple!
5. Remember the "3 B's": big, bold, and stay away from borders.
6. Stay with one type style per design. Too many different designs can be confusing.
7. Use capital letters only in titles and for emphasis.
8. Try to use horizontal formats, since this is the way visuals are seen on television, movies, billboards, and computer monitors.

9. Stay away from lists of statistics in your visual presentations. Emphasize the visual, not the verbal.

Software for the Apple IIe to Assist in the Development of Instructional Materials

AppleWorks (Apple Computer, Inc.)

AppleWorks is an integrated software package consisting of database management, word processing, and spreadsheet that permits you to easily move from one type of file to the next. The commands are consistent in all three applications. The database is used to organize and report information ordinarily kept in lists or on index cards. Once the file has been designed and the data entered, reports can be printed in table format, mailing label format, or individual records. The word processor is used to create and edit documents such as letters, memos, and reports. The spreadsheet is used to make calculations with data according to formulas that you supply. Special printer functions are available to produce special characters.

You can use the word processing component of *AppleWorks* to create tests, study guides, course syllabi, reports, and correspondence. The spreadsheet can be used to maintain grades and budgets. Databases can maintain student demographic and academic information, textbook inventory, lunch lists, etc.

You can use the word processor to create "story starters," work sheets, cloze paragraphs, etc. Students can use the word processor to write reports and practice editing procedures. Databases can be created for almost any subject area, and students can use them to answer questions or enter pertinent information. Students can also design databases for both academic and personal use. You can create spreadsheets to promote logical thinking and problem-solving, let students see real-life applications of mathematics, and familiarize them with a business tool. Students can design *AppleWorks* spreadsheets to monitor budgets, solve word problems, make projections, or set up a hypothetical business.

Dazzle Draw (Brøderbund)

Dazzle Draw includes drawing tools that let you create color graphics and print your creations in color or black and white. You can use the slide show feature with the computer and a large-screen monitor to present screens of colorful information and graphics. Screens can be printed for use as study guides, tests, and work sheets.

Fantavision (Brøderbund)

Fantavision is a program that lets you draw separate frames of animation, which can be very useful in subject areas where detailed demonstrations of action or motion are helpful in the learning activities. You and your students can create animated sequences to show the class on large-screen monitors. A demonstration is included which shows parts of a flower and the potential the program has for instruction.

The Grammar Examiner (Designware)

The Grammar Examiner is a competitive game for one to four players on a computerized game board. Each player starts as a cub reporter and is given opportunities to answer difficult grammar questions and proofread short news stories. The player's salary is raised or lowered according to performance at the assigned tasks. The player who reaches the editor level first wins the game. The program allows you to create and store grammar questions, short news stories, and even the game board. You enter passages from textbooks or other sources for students to practice correcting while becoming familiar with the content.

How Can I Find It (Sunburst)

How Can I Find It helps students locate specific books, facts, or other information. The package also develops the concept of the computer as an aid in information retrieval and increases students' skills as independent users of the library media center. The program's question format leads the student through a series of branching operations to explore the resources of the library. An easy-to-use change option allows the program to be customized to include the reference books currently available in the school library.

Keyboarding Master (MECC)

Keyboarding Master allows students to perfect their keyboarding skills. The package contains motivational games that develop speed and accuracy and track student progress. Practice typing routines can be customized to use subject content.

Labels, Letters, and Lists (MECC)

With *Labels, Letters, and Lists* you can enter class information and generate lists, customize letters, and make name tags, labels, and forms. A printer is required, and knowledge of *AppleWorks* is helpful. Special printer commands can be used with this program to make lettering of different sizes and styles.

Newsroom (Springboard)

Newsroom lets you design and print professional-looking newspapers and flyers, using graphics and columns. You can select from a library of over 600 pieces of clip art and combine them, alter them, or create your own. You can make distinctive headlines, using extra-large type faces, borders, and tones. There is also a word processor that enables you to write text with a choice of five different type faces. Photos can be positioned wherever you wish, and text automatically rearranges itself around them.

In addition, the program can be used in nearly any subject area to fulfill creative assignments such as designing advertisements, recreating a newspaper from a particular era, publishing a student or club newsletter, and studying reporting. You can put together informational documents with graphics and articles for students to study. This program does require training or a good amount of computer experience.

PFS: File (Software Publishing Company)

PFS: File enables you to design a form and then fill in the information, which can then be sorted, grouped, and printed according to your needs. Students can use the database files that have already been created to search for information about U.S. history, life science, and physical science. Special printer commands can be used to vary the size and style of the type.

Consult the description under *AppleWorks* for ideas relating to the use of databases. This database allows more text to be entered in each record than does *AppleWorks*, which may prove useful in a language-arts class for organizing excerpts from literature.

PFS: Report (Software Publishing Company)

PFS: Report works with *PFS: File* to enable you to generate lists from the information in the file and perform certain math functions on numbers in the files. The program will also let the student access information from the existing databases mentioned above. Special printer commands can be used to vary the size and style of the type.

See *PFS: File* for suggestions about developing instructional materials.

Puzzles and Posters (MECC)

Puzzles and Posters creates puzzles for students, including word finds and crossword puzzles from your own input. It can be used in any subject area to produce puzzles involving vocabulary words. The program can also produce banners and signs. It requires a printer.

Quickflash! (MECC)

Quickflash! allows you to create flash-card drills for any grade level or subject matter. The computer keeps track of all problems that a student has mastered and removes them from the drill. It is very helpful for improving memory skills.

Study Guide (MECC)

Study Guide lets you create computerized drill-and-practice lessons. Because the program content is determined by you, it is appropriate for any subject. Questions can be in true-false, matching, and multiple-choice formats. Students are quizzed on the content of the lessons, and their scores are recorded on the diskette. These scores can be printed.

Word Attack (Davidson)

This program by Davidson is divided into nine levels. The words on levels 7, 8, and 9 will help students prepare for the *Scholastic Aptitude Test*. There are three word lists for each level: adjectives, nouns, and verbs. Each word is introduced on the screen with a synonym or brief definition and a sentence illustrating correct usage. This section is repeated until the student is ready to go on to the multiple-choice quiz and sentence completion. The final phase of each section is "Word Attack," a fast-action arcade game that reinforces learning. The student works against time to match the vocabulary words with their meanings. You can add your own word lists, saving the files on data diskettes. Misspelled words can be recycled in multiple-choice and sentence-completion activities. No permanent recordkeeping is provided.

**Software to Assist in the Development
of Motivational Print Materials****Certificate Maker (Springboard)**

Certificate Maker can produce personalized certificates with over 200 variations. The user must choose the certificate, border, and date. The program also allows you to create a name file, so that the computer will automatically print certificates for everyone in a class or club. Students can also benefit from using *Certificate Maker* by experimenting with graphic designs and practicing layout skills.

Clip Art Collection (Scholastic)

Clip Art is designed to be used with *Newsroom*. It supplies many graphics that can be used in newspapers, flyers, or teacher-produced work sheets. Students can also use the graphics in *Clip Art Collection* to illustrate their papers.

Print Shop (Brøderbund)

Print Shop lets you create signs, greeting cards, letterheads, and banners. Sixty different graphics are available, as well as eight different styles of type (solid, outline, and three-dimensional letters) and a variety of sizes and positions for graphics. Also included is a "Screen Magic" mode, which allows you to print out high-resolution graphics from another graphics program. Using the graphics editor, you can modify the program's library of graphics or create your own graphics.

This program is great for making signs of classroom rules and guidelines, upcoming events, directions, or rewards for good work. Banners of the week's activities can be generated, so that students are always reminded of them. Covers for student reports are easily generated.

Print Shop Companion (Brøderbund)

Print Shop Companion contains twelve type styles, fifty creative borders, custom calendars, a "fun and crazy creature marker," and type and border editors. It has a specially enhanced graphic editor incorporating many of the most popular features of other drawing programs, including flood fill patterns, mirror imaging, inverting and flipping of graphics, and mouse control. The graphic editor allows you to take graphics from other programs for use in *Print Shop*. It also contains an illustrated reference manual. The package must be used with *Print Shop*.

Print Shop Graphics Library, Volumes 1, 2, and 3 (Brøderbund)

Print Shop Graphics Library enhances the *Print Shop* program by offering hundreds of different graphics that can be used in banners and signs. Graphics cover many subjects and interests. The package must be used with *Print Shop*.

Puzzles and Posters (MECC)

Puzzles and Posters creates puzzles for students, including word finds and crossword puzzles from your own input. The program can be used in any subject area to produce puzzles involving vocabulary words. It can also produce banners and signs. A printer is required.

Software for the Macintosh to Use in the Development of Instructional Materials

MacWrite (Apple Computer, Inc.)

MacWrite offers a wide selection of type styles and sizes that can be mixed on the same page. See the descriptions of *AppleWorks* for word processing ideas. Output from the Macintosh can be printed on a LaserWriter printer for near-typeset quality.

MacPaint (Apple Computer, Inc.)

MacPaint offers the same text features as *MacWrite*, but its main thrust is the creation of graphics. The program allows you to create pictures with tools that make it easy to draw circles, lines, and boxes.

MacDraw (Apple Computer, Inc.)

MacDraw makes it easy to design forms, fact sheets, or any other document that needs boxes around words or other special graphic functions.

File (Microsoft)

File makes it easy to produce lists of information that students can use to study. Lists can be printed inside numbered grids for easier reading. See *AppleWorks* for instructional ideas relating to databases.

Chart (Microsoft)

Chart converts data into many forms for flexible presentation. Information can be compared and contrasted on a variety of graphs and charts.

CHAPTER 11

MANAGING INSTRUCTION

Computer-managed instruction (CMI) is a system that diagnoses student responses and adjusts presentation or practice accordingly, prescribes appropriate follow-up practice items or lessons, tests for mastery, and records student performance. Its use is frequently characterized by the presence of networked microcomputers. A CMI system implemented on a network of computers would augment the instructional process at F. M. Black Middle School.

Problem

F. M. Black Middle School is using various software packages in language arts and mathematics, each with its own management system. These recordkeeping systems collect the desired information, but getting to that information is a problem, as is the cumbersome nature of physically handling and organizing the many floppy diskettes needed to accommodate files for the 125-150 students most teachers have. The teachers need a means to facilitate both the recording and accessing of student information while easing instructional burdens and creating an environment in which computers are truly for personal use by the student.

Solution

A CMI system implemented in a network of computers would alleviate the organizational problems the teachers were having with the use of stand alone computers. Local area networks (LANs) using large capacity hard disk drives have been used in business for many years and are now becoming more common in school settings. In addition to making computer lab management far simpler, local computer network schemes cut costs by permitting the sharing of peripherals, resources, instructional programs, and in some instances personnel.

In essence, using licensed software on a network negates the need for multiple copies of diskettes and manuals. It also cuts down on damaged or lost data and diskettes due to frequent handling. Thus, a local area network for the CMI system at F. M. Black (and applicable to other schools as well) would provide:

- accurate recordkeeping
- quick reporting
- precise monitoring of student work in progress
- increased accessibility to programs
- controlled access to files and programs
- faster distribution of programs and results (performance and attendance)

The CMI system would permit constant diagnosis and evaluation of student performance and branch accordingly. With CMI, students requiring more practice are given more problems, while students requiring review of the concept are retaught or given additional help or clues through appropriate subroutines. Those students needing more challenge are stepped up in either type of problem or level of the concept or skill being taught. Feedback is appropriate to the remediation or advancement taking place.

Accordingly, on-line instruction is immediately responsive to a student's needs and level of achievement. Lessons are tailored to the student and encourage teacher participation. Prescriptions for either on- or off-line follow-up activities can then be assigned and distributed according to teacher specifications and/or the predetermined course and skill objectives. Students are continuously kept on task—precisely the individualized instruction that F. M. Black wants to achieve, and what would be most likely desirable at other schools. Following is a plan for CMI that would meet F. M. Black's needs, and with modifications, the needs of most other schools.

USER EXPECTATIONS

F. M. Black's Plan

The main goals for computer-managed instruction at F. M. Black are:

- greater control over the curricular process
- ease of student data collection
- reduced paperwork in attendance, scheduling, and reporting test, grade, and skills mastery
- increased student performance through individualized instruction

The major user expectations for a networked CMI system at F. M. Black are:

- student performance and attendance reports
- reports by objectives and mastery of skills
- instructional strategies/student skill mastery levels matched to assessment results
- immediate feedback to all concerned
- timely decisions regarding student assignments made on the basis of specific student performance
- flexible software scheduling
- continuous monitoring of student activities and needs
- automatic and simultaneous file updates
- software matched to curriculum

- class scheduling and demographic reports
- easy-to-use network manual for installation and maintenance
- ability to use a variety of commercial software packages

Since a networked CMI system was not part of the original equipment from Apple, the project planners have designed an "ideal" system to meet F. M. Black's needs. Other schools should modify this plan as appropriate.

The proposed plan calls for the school's labs to be networked. Apple IIe computers will be used as terminals (workstations) on the network. Currently F. M. Black has three computer labs, each slightly different from the other. In these labs there is a total of 83 Apple IIe computers, 146 disk drives, and 31 ImageWriter II printers.

Each classroom workstation will be tied in to the host computer. Teachers will be able to obtain test scores, skills mastery information, and prescriptions. They will also be able to select or direct programs and activities for students in the labs.

Administrators and support staff will also have work stations linked to the host computer which enables them to add, change, scan, and delete student data and print summary reports.

ELEMENTS OF THE NETWORKED CMI SYSTEM

- **Test Grading**

Reduce time and effort by automatically grading student tests in interactive mode or through the use of an optical character reader connected to a microcomputer. Provide timely test results to teachers, parents, and administrators.

- **Gradebook Management**

Reduce time and effort spent in recording, reporting, and averaging student grades by performing those activities with a microcomputer.

- **Attendance Management**

Reduce time and effort spent in maintaining and reporting student attendance records by performing those activities on a microcomputer.

- **Class Scheduling**

Reduce time and effort spent in class scheduling with the aid of a microcomputer.

- **Competency Assessment**

Provide a measure of students' mastery of a set of standard educational objectives developed or adopted by the district.

- **Prescription Assignment**

Furnish a list of specific prescriptions to aid students in the understanding of unmastered objectives.

- **Summary Reporting**

Permit the necessary reporting to summarize student mastery of objectives.

This CMI system will save large amounts of time. The system will also reduce the frustration of the people who now must keep track of teacher student interaction information manually. It will allow more time for direct education-related activities. Along with the considerable benefits of the system, however, there are associated costs, which must be recognized:

- The microcomputer used as the file server will require a hard disk (preferably with at least a 70-megabyte capacity).
- A higher-than-normal speed printer may be needed to supply test results as quickly as needed. (at least 200 cps)
- At this time, a microcomputer with 1 megabyte of RAM should be sufficient to process this system. However, it is very possible that additional needs will necessitate more memory.
- To grade paper-and-pencil tests and provide results as quickly as needed, an optical character reader connected to a microcomputer may be used as an option.

The points above will affect the hardware and software costs of the system.

- Clerical help will need to be allocated so that individual teachers will not have to operate the system.
- It takes time and effort to learn and implement any new system. The same is true of the CMI system. Within a brief period, however, much time will be saved. However, costs will be associated with training.

Activities requiring specialized knowledge include:

- Development of detailed objectives (or the choice of a standard, state or national set of objectives) for use by the district.
- Development of a set of test questions to check mastery of those objectives. It is critical that these questions be written so as to be a valid test of the students' mastery.
- Development of a method for using objective criteria and weighting of answers for grading essay questions.
- Development of the criteria for determining mastery of objectives (e.g., number of questions answered correctly). These criteria may vary, depending on the type of objective being tested.
- Development of procedures to field-test the reliability of the system before actual implementation.
- Determination of the target dates for mastery of each type of objective.
- Determination of desired procedure to retest students selectively and revise records accordingly. Retesting methods are required not only in the case of students who did not master objectives on the first testing but also to demonstrate continued mastery by students who were successful initially.
- Development of a list of prescriptions to match the objectives. Again, these prescriptions must be so structured that logical subsections can be handled by the microcomputer's capacity.
- Determination of how test results are to be used in preparing grades. Accordingly, will the percentage of objectives mastered, the percentage of questions answered correctly, some combination, or some other criteria be used in developing student grades?
- Determination of software availability for use on the network. This may simply be the licensing of already purchased packages. It may also involve the purchase of new software.

Many of the points above will require considerable time and effort to implement. Therefore, if action on these items is delayed, implementation of the latter sections of the CMI system will be delayed accordingly.

USERS

The users of this system will be F. M. Black teachers and administrators, with test input coming from the students and the results being available to the students and parents either directly through system reports or indirectly through conferences with the teachers.

SECURITY

Because of the confidential nature of the data maintained by this system, strong security measures are necessary. To enter basic data or print reports, the operator must enter a system password; without a valid password, the system will not allow access to the data. In addition, a separate master password will be required for manual input to add or modify test results. This master password will be available only to the administration of the school.

The diskettes containing the system master and data files are to be maintained in a secure file and office, both of which will be locked when not in use. Backup diskettes are to be stored in a separate, locked location. The networked microcomputer hardware itself is to be stored in a secure location that can be locked when the terminals are not in use.

NETWORK SOFTWARE

Network software directs functions of the hardware and coordinates the transmission of information. It manages the network operation. The network software must allow for:

- multiple levels of protection either through passwords or access codes or through volumes (partitions on the hard disk) designated as public, group, and private
- multiple levels of access designated within a volume or ascribed to passwords or codes for the read, write, erase, create, and delete functions
- print from within the instructional software as if the student were at a stand-alone microcomputer
- simultaneous access to several volumes of programs and/or files
- interactive/cooperative on-line learning activities in which students work with the teacher or with other students
- an electronic message system
- further integration of information systems, such as library services
- easy modification, update, backup, and problem diagnosis
- use of floppy diskettes at particular stations
- use of multiple operating systems
- independent functioning of its systems (so that if one station goes down, it will not drag the whole network down with it)

Network software must also provide:

- collision avoidance/detection
- menu-issued commands
- fast exchange rate of data with the file server in bits per second
- least amount of time to access software and data files when the entire system is in use
- automatic file updating
- high reliability of data transmission and exchange
- applications and overhead software adaptability
- easy installation and upgrading
- flexibility to expand
- easy debugging of hardware problems
- an easy to read manual

INSTRUCTIONAL APPLICATIONS SOFTWARE

The choice of instructional applications software is limited by the operating system. It must also be available in a version that permits it to run on the network. Its cost in a multiuser networked version must be reasonable, and the software must be appropriate to the curriculum. It is projected that it may not be possible to use any of the software presently in use at F. M. Black in the proposed network. It will probably be necessary to purchase new software in order to make full use of the network's capabilities. As always, the decision to purchase instructional applications software should be based not only on the equipment but also on the quality of the instructional material available.

NETWORK MANAGEMENT

Management of the network should be in the hands of a single individual, the network administrator, who should be a member of the administrative staff. This person may be assisted by a clerk.

Responsibilities of the network administrator

- Define public, group and private volumes and access rights.
- Assign passwords or access codes.
- Monitor system use and schedule accordingly.
- Be the liaison with vendor and technical support personnel.
- Perform initial troubleshooting.
- Schedule transfer of programs and files as needed.
- Supervise routine maintenance on system (hardware and software).
- Facilitate and direct hardware and software acquisitions.
- Provide assistance with training and routinely schedule training.
- Delegate tasks to records clerk.

Responsibilities of the records clerk

- Assist the network administrator.
- Pull and distribute reports as needed.
- Key in student enrollment in classes or groups as designated.
- Key in other data required for prescriptions and correlations.

Conclusion

Implementation of CMI in a networked environment at F. M. Black Middle School requires reorganization of existing hardware and software with minimal capital outlay for network equipment and new software. Support by the staff in setting up the system and managing the instructional data is mandatory. The CMI network has the potential to improve academic performance and productivity of students by responding efficiently to their needs and capabilities. It will decrease paperwork and organizational tasks now done by teachers, releasing them to interact with students. The CMI network is expected, in the final analysis, to create a better framework for effectively integrating curriculum and computers.

CONCLUSION

The purpose of this handbook has been to give the school administrator ideas for using educational computing technology effectively, based upon the F. M. Black Middle School experience. What works in one school or district may not work as well in another without modification. The big question that might be going through the reader's mind at this time is, "Is it worth it?" The answer is yes. Research was done at F. M. Black that dealt with the attitudes of the teachers, students, and parents. All of their comments indicated that the program had a positive effect on the school.

Students enjoyed coming to school, teachers felt more like professionals, and parents felt that their children were being better prepared for the future. If even one chapter of this handbook can be of use to someone implementing computers in a school setting, then it is felt that our experiment has been a success. The dissemination of information provided in this handbook is but one result from a long and continuing journey into the future of education.

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